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## AMMUNITION BULLETIN N°13.

FOR INSPECTING ORDNANCE OFFICERS.

(SEPTEMBER 1940).

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CHIEF INSPECTOR OF ARMAMENTS,  
WOOLWICH, S.E.18.



SECURITY.

AMMUNITION BULLETIN NO. 13.  
For INSPECTING ORDNANCE OFFICERS.

Issued      September, 1940.

Issued by :-

CHIEF INSPECTOR OF ARMAMENTS,  
WOOLWICH.

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125. Disposal of blind shell found in the United Kingdom.

1. The type of shell most likely to be found in the United Kingdom under the present conditions of air warfare, is fired from a light gun with a calibre of from 20 to 40 mm. These shell, whether of our own or enemy manufacture, are fitted with a nose fuze of the direct action floating needle type, e.g. D.A. No. 250 and the fact that they have failed to explode must not be regarded as due to a defective fuze and that they are, therefore, perfectly safe to handle.

Failure to explode has been due to the fact that the shell has missed the target and therefore the fuze has not functioned. It should be borne in mind that, in all probability, the fuze is still armed when these shell are found; it is, therefore, in a very sensitive and dangerous condition and extreme care and every precaution is necessary when handling them.

2. These shell should be carried horizontally, collected in a suitable receptacle and packed horizontally, to prevent movement, in sawdust or other suitable packing material under the supervision of an I.O.O. A pair of long handled tongs made up locally and shaped to grip the shell is recommended for this purpose.

If facilities exist they will be disposed of by dumping in deep water. Should this not be practicable, they will be destroyed with adequate safety precautions under the supervision of an I.O.O.

In the case of enemy shell of larger calibre these should be dealt with as in para. v and vi Item 31 Bulletin No. 4.

126. Nitrocellulose Tubular (N.C.T.)

The following notes on N.C.T., which may be used as the propellant for certain equipments in future, are issued for information.

N.C.T. is not used in the form of a cord owing to its brittle nature but is cut into short cylinders having a length equal to about twice the diameter and pierced longitudinally with up to 7 holes. The size is denoted by the web thickness, that is, the thickness of the powder between the perforations. This figure is given in thousandths of an inch. N.C.T. has been found to bulk larger by about 20 per cent. than Cordite W.

N.C.T. is normally lighter in colour than cordite but darkens with age and may become a deep brown or black. It absorbs moisture somewhat more readily than cordite and therefore, precautions to prevent the access of moisture must never be relaxed. It must be carefully protected against changes in temperature, high temperatures and moisture and, to guard against such changes, N.C.T. powder is always packed in air tight containers. When a container of N.C.T. is opened the characteristic odour of ether and alcohol vapours will be noticed. This is an entirely normal condition, but the container should be immediately closed to prevent the escape of these vapours. This odour should not be mistaken for the acid odour of nitrous fumes denoting decomposition of the N.C.T.

It is less powerful than cordite and a larger charge of N.C.T. is therefore required to produce the same muzzle velocity as a cordite charge. It possesses the advantage of burning at a lower temperature than cordite and thus causes less erosion in the gun.

In normal storage N.C.T. may be considered as a fire or mild explosive risk but if struck by a high explosive bomb there is a risk of a violent explosion.

N.C.T. is packed in bulk in metal-lined wooden boxes.

Instructions for the examination and testing of nitro-cellulose powders in bulk or in cartridges are contained in Appendix III, Pamphlet No. 7, R.A.O.S. Part 2.

127. Cheddite.

Cheddite is the name given to a group of explosives of the disruptive type containing a chlorate or perchlorate and a combustible oily material.

The standard Cheddite as used formerly in this country had the following composition :-

Potassium Chlorate	79
Castor Oil	5
Mononitro-naphthalene	1
Dinitro-toluene	15

A number of Cheddites have been used by the French not only for blasting purposes, but also for shell fillings. Potassium and sodium chlorates and also ammonium perchlorate have been used in various Cheddites. Mixtures containing sodium chlorate are liable to absorb moisture unless the cartridges are water-proofed.

The standard Cheddite as above is a soft yellowish material of fine grain but it is sometimes artificially coloured. In consequence of its plasticity it can be easily moulded into shape and is generally made up into cartridges 22 cm. long and 2.5 cm. diameter. Some cheddites may be white and hard or granular.

Cheddite is readily compressed but its sensitiveness to detonation diminishes with increased density.

Its rate of detonation is about half that of picric acid although this varies considerably with the density to which it has been compressed.

It must be treated as a sensitive explosive (Group 1) and its sensitivity must be considered to increase rather than diminish with age.

128. Cordite Heat Tests.

As some misconception has arisen regarding the object of carrying out heat tests of cordite which has failed in the Surveillance test it is pointed out that, as the Surveillance Test is individual in character, such heat tests are carried out for record purposes only and are not intended to govern the sentence on the balance of the cordite of the same Lot number held at the station which has not failed in the Surveillance Test.

129. 25-Pr. A.P. Shot.

A number of 25 Pr. A.P. shot packed at Woolwich between 24.5.40 and 4.7.40 were issued during the emergency with wet markings. As no air can get to the paint to dry it off it will remain wet for a considerable period and the markings may become obliterated when the shot are handled. Boxes containing shot packed between the above dates should be opened up and the paint thoroughly dried, any obliterated markings being renewed.

130. Cartridges B.L. Use of Viscose Cloth for Cartridge Bags.

Approval has been given for the use of Viscose Cloth (Courtaulds Rayon) as a substitute for silk cloth in B.L. cartridge bags.

No special marking of these bags is considered necessary.

131. Disposal of Unserviceable Projectiles.

Cases may occur in which filled shell or fixed Q.F. Cartridges may be involved in a fire. They may be fuzeed or unfuzeed and the general procedure to be adopted by I.O.O's is based on the following considerations. When these types of Ammunition are exposed to fire, the shell explosive filling will melt and probably enter the threads of the fuze hole rendering the removal of plug or fuze an operation to be undertaken under Laboratory precautions only. The detonators of the fuzes and gainees will probably be destroyed and certain internal components of the fuze may be destroyed.

It will be evident that such Ammunition is no longer serviceable and may, if fuzeed, be dangerous, consequently, it should be disposed of, preferably, in the case of fuzeed shell, in situ.

Where a dump of Ammunition receives a hit by a H.E. Bomb, any shell which remain unexploded and visually serviceable should be set aside and the circumstances reported to C.I.A.

Projectiles of less than 4.5" calibre cannot be expected to communicate detonation from one to another consequently in disposing of unserviceable shell of these calibres on the destruction ground it will be necessary to deal with them in small groups, otherwise any which fail to explode will be projected for considerable distances and, if fuzeed, may function on impact.

132. Apparatus, U.P.

This Ammunition is issued to the Service packed as follows :-

Propellant.	2 in a box, with fins, M.97 = 59" x 14 $\frac{1}{4}$ " x 6 $\frac{1}{4}$ "	weight packed 84-lbs.
Projectile.	4 in a box, plugged, M.98. = 20 $\frac{3}{8}$ " x 8 $\frac{5}{8}$ " x 8 $\frac{1}{2}$ "	weight packed 84 $\frac{1}{2}$ -lbs.
Fuzes A.D.	packed in box, M.101.	= 18.25 x 10.65 x 10.9 to hold 8 consisting of fuze, adaptor and gaine in tinned plate container.
Fuze M.I.	packed in box M.102 to hold 4.	= 25.6 x 11.25 x 11.25. consisting of fuze and gaine in tinned plate cylinder.

For purposes of safety distances in storage the propellant will be assessed as 25-lb. per package, Category Y, and the Projectile at 17-lb. per package, Category Z. Each element, i.e. Propellant, Projectile and Fuze is placed in Group VI for storage purposes. The packages are of wood.

When stored in Bin type Magazines 224 Projectiles, (56 packages) can be put in one bin during Peace or 280 Projectiles, (70 Packages) in War. The propellant charges can be stacked to capacity, provided packages are kept at least 6 inches clear of the walls of the bin. A standard Binless Magazine at 30 yards intervals will accommodate 10000 Projectiles (2500 packages), 10000 propellant units (5000 packages) or 6000 complete rounds. Fuzes can be kept in the bin or binless building additional to the propellant and projectile.

Packing diagrams will be issued in due course.

133. Demolition Accessories.

Fuze Instantaneous, Detonating, T.N.T. Mk.III (F.I.D.) consists of a lead and tin alloy tube about .23 inches in diameter filled with specially prepared T.N.T. It detonates at 5,000 metres per second and is supplied in lengths of 400-ft. wound on a metal reel in a tin cylinder painted yellow. The weight of the filled container is 46-lbs. and the dimensions 13 $\frac{3}{4}$ -inches by 4-inches deep. It is also supplied in lengths of 150 and 200-ft.

Fuze, Instantaneous, Mk.IV is enclosed in a waterproof tape coloured red and burns at 90-ft. per second. It is supplied in reels of 300-ft. the weight and dimensions of which are the same as for F.I.D.

Fuze, Safety, No.11, Mk.II consists of a column of fine gunpowder enclosed in Jute yarn covered with gutta-percha protected by a varnished black tape, the whole having a diameter of about .21 inches. It burns at 2-ft. a minute and will function under water. It is issued in black cylindrical tins containing 48-ft. Seven of these tins are packed in a wooden crate 17 inches by 21 inches weighing 129 lbs.

Cordeau-Bickford consists of a lead tube completely and uniformly filled with T.N.T. The velocity of detonation is about 4500 metres per second. It is packed in lengths of 300 ft. the complete package weighing 40-lbs.

Primacord.

Primacord is the American equivalent of Cordtex, the textile detonating fuze which is manufactured by Nobels Explosives Ltd.

It consists of a core of P E N T A - E R Y T H R I T O L - T E T R A - N I T R A T E (P.E.T.N.) surrounded by a cotton braid and enclosed in a coat of bituminous waterproofing compound followed by a layer of pliofilm tape and two layers of spirally applied cotton yarns, the whole being coated with an orange coloured wax composition.

The external diameter varies from .200 to .210 inches and the velocity of detonation is about 6000 metres per second.

Packing. Primacord is wound on reels containing 500 or 1000-ft. the gross weight being:-

500-ft.-12-lbs., 1,000-ft. - 20 lbs.

Cordtex plain, consists of a core of P.E.T.N. surrounded by cellophane tape and enclosed in layers of jute and cotton yarn contained in a tubular covering of a waterproof composition resembling aluminium in colour. The external diameter is .19 inches. It is packed on wooden reels of 500-ft. weighing 9 $\frac{1}{2}$ -lb. Five reels are packed in a case, weight full 67-lbs. dimensions 3-ft.7-inches by 11-inches sq.

Cordeau-Detonant was made in France and is the same as service F.I.D. except that the tube is of lead instead of an alloy of tin and lead. It is usually wound on wooden drums containing 500-ft.

134. 40 m.m. Ammunition.

With reference to Item 92 Bulletin No.9 the complete number of cartridges affected are contained in sub-batches B.101 A to B.105 F. If not already done packages containing these Cartridges should be marked as laid down in Item 92.

135. Depth Charges for demolition purposes.

A certain number of depth charges used in the Naval Service have been issued to the Land Service for demolition purposes. These charges have a central tube which contains a "Primer depth charge" and a "Charge priming T.N.T." for initiation purposes. The latter is a loose fit in the tube and some difficulty may be experienced in securing it in position. This can be effected by the use of plastic explosive or paper wrappings.

136. Fuze, Time, No. 209.

No. 209 fuzes which, when M.F. Setters are not in use, are set to a certain setting on an alarm should not be re-set to zero if not fired. No harm is likely to occur to the main spring of these fuzes even if the fuze is kept set for long periods. On the other hand constant setting and re-setting to zero is likely to loosen the setting indicator cap with the added risk that in re-setting the fuze to zero the latter may be overrun and an error of more than half a second in this respect would ruin the time mechanism.

137. Ammunition for 75 m.m. Q.F. guns. (Figs. 30, 31 and 32).

This ammunition is fixed and a complete round consists of a cartridge case with percussion primer and propelling charge, a H.E. shell issued plugged and a D.A. percussion fuze.

The brass cartridge case is flanged at the base and slightly tapered for extraction purposes. A central opening, slightly tapered, is formed in the base to take the percussion primer, which is forced into its seat by a press.

The percussion primer consists of a slightly coned brass body formed with a diaphragm and containing, at the base end, the percussion arrangements and at the front end 47 grains of black powder. The mouth of the primer is closed with a strawboard closing wad secured by the crimping over of the mouth and coating it with shellac.

The percussion arrangements consist chiefly of a firing plug, a .87 grain detonating pellet covered with a paper disc, and a brass anvil. The detonating composition consists of :-

Sulpho cyanide copper	3%
Sulphur	7%
Sulphide of antimony	30%
Potassium chlorate	60%

The cartridge case is secured to the shell by indenting into two cannellures formed in rear of the driving band, the base of the shell being waterproofed before insertion in the case. The propellant charge consists of 1-lb. 5-oz. 9-dr. flashless M.C.T. F.N.H. (flashless non-hygroscopic) powder filled loose in the case.

Two marks of H.E. shell may be met with, a Mk.I and Mk.IV. The Mark I has a  $1\frac{1}{2}$  c.r. head and the nose is threaded to take an adapter and gaine. A brass cover with lead disc is fitted into a groove in the base to prevent the gas from the propelling charge coming into contact with the explosive filling of the shell through a possible defect in the base and thus causing a premature. A copper driving band is pressed into a groove near the base, the groove is knurled or roughened to prevent the band turning on the shell. The interior of the shell is shellacked varnished and the filling consists of about 1.75-lbs. T.N.T. A few shell filled Amatol 50/50 may be met with.

The Mk.IV shell differs from the Mk.I in having a 6 c.r. head and a streamlined base. The filling is about 1.4 lbs. T.N.T.

The D.A. percussion fuze is known as the P.D.F. (point detonating fuze) Mk.IIIA, and resembles the No.106 percussion fuze in its action. It consists of a body with the safety and detonating arrangements and has an overall length of 7.4 inches in order to detonate the shell above ground.

The body is of brass, threaded externally to screw into the nose of the shell and has a central channel to convey the flash from the upper to the lower detonator.



The detonating arrangements consist of a steel needle with steel head, a percussion primer, upper and lower detonator. A steel shearing pin passes through the needle and the body of the fuze, the ends of the pin are bent over to secure it in position.

The safety arrangements consist of a split ring which fits under the head of the firing pin and is held in position by a brass tape to the outer end of which is attached a weight to assist in unwinding the tape in flight. The brass tape is secured in position by a length of tarred tape the whole being enclosed in a lead foil cap which fits over the head of the fuze and is secured by waterproofing composition. An additional safety arrangement consisting of a centrifugal plunger is screwed into the side of the fuze body. Normally the plunger closes the central channel in the fuze and is set at an angle so that acceleration tends to oppose centrifugal force. Thus the plunger closes the central channel until the shell decelerates after it has left the bore.

The fuze is marked by a  $\frac{1}{4}$ -inch blue grey band painted immediately below the waterproof cover.

Note. The fuze should not be screwed into the shell if the tarred tape and lead foil cap are not in their proper places. Before loading, the tarred tape and cap are removed and the fuze should then be examined to see that the brass tape and safety pin are in their proper positions. If the brass tape is broken the fuze cannot function for centrifugal force cannot arm the fuze unless the weighted end of the tape is in place. A damaged fuze should be removed and destroyed.

Action. On firing the effects of set back, due to acceleration, on the head of the needle retains the brass tape in the wound up position. On deceleration after the shell has left the bore the rotary movement of the shell causes the tape to unwind and thus free the split ring. At the same time the centrifugal plunger moves outwards, overcoming its spring and leaving the central channel in the body clear.

On impact the needle is driven in on to the primer shearing or bending the shearing pin. The flame from the primer fires the upper detonator, and the detonation passes through the central channel to the lower detonator, giving and bursting charge of shell.

Packing. The complete round (shell plugged) is packed in a rolled paper container in a wooden box to hold four. A larger box to hold nine rounds in tinned plate containers may be met with.

The P.D.F. fuzes are packed 50 in a wooden box.

The weights and dimensions of the various packages &c. are given in the following table.

Package	Overall dimensions in inches.			Weight in lbs.		
	length	breadth	depth	empty	filled	complete round
Box containing four rounds in rolled paper containers.	31	$9\frac{1}{2}$	$9\frac{1}{2}$	$17\frac{1}{4}$	$92\frac{3}{4}$	17 - 10-ozs. (without container)
Box Containing nine rounds in tinned plate containers.	29	14	$12\frac{3}{4}$	$32\frac{3}{4}$	$203\frac{3}{4}$	
Box containing 50 P.D.F. III fuzes.	18	9	$9\frac{3}{4}$	$16\frac{1}{2}$	65	Weight of fuze. $15\frac{1}{2}$ -ozs.

133. Enemy Ammunition.

Details of German (Rheinmetall) electric fuzes)

Correct to 29.8.40.

No. of fuze	Bomb used in	Description	Marking	Typical subsidiary markings	Colour	Remarks
9	Parachute flare.	Time fuze for parachute flare with glow discharge tube.	EL.Zt.Z (9)	Rhs. 1938 5a	Red	Safe to handle after 60 sec's.
15	H.E. bombs	General purpose H.E. bomb fuze with D.A. and delay, 0.3 and 8.8 sec's.	EL.AZ.C50 (15)	Rhs.1938 42d.	Unpainted Aluminium	Safe to handle after use of discharging apparatus.
17	"	Long delay fuze with clockwork mechanism Probable range 2 1/2 hrs. to 60 hrs.	EL.AZ (17)	Rhs.1940	Body of fuze unpainted or dark grey Clockwork unit unpainted with black rubber band.	Not safe to handle under 2 1/2 and 90 hrs.
25	"	Modified edition of the No.15 fuze, with D.A. and delays of 0.5 and 15 sec's.	EL.AZ (25)	Rhs.195 1940	Dark Grey	About 200 repetitions of alternative discharge and rest are required to render this fuze safe.
26	110 Kg. incendiary bomb.	Fuze with air pressure switch. D.A.	EL.AZ. (26)	Rhs.1939 15b	Green	Safe to handle after use of discharging apparatus. Bomb can be identified by the star on shell of fuze.
28	H.E. bombs.	As for No.25 but 0.5 delay can be cut out.	EL.AZ (28) A	"	Dark Gray	As for No.25
33	"	Modified No.15 with D.A. or 12 sec's delay.	EL.AZ. (33)	Rhs.194 2 (33)	Unpainted Aluminium	As for No.15
50	"	Electrical anti-handling mechanism.	(50)	None	Green but may be other colours.	See General Notes.

GENERAL NOTES.

1. With all the above fuzes there is a delay of 10 seconds from the instant of release before the fuzes are armed.
2. The important marking is the number in the circle Col.4, it indicates the type number of the fuze. Other figures, such as "50" in the marking on the No.15 fuze, should be disregarded.
3. The colours given are those of fuzes recovered and examined. They may vary.
4. Two different fuzes may be fitted to one bomb, e.g. a No.17 and a No.50 fuze have been found together in one bomb.
5. C 50 fuze. This fuze is apparently intended to act as an anti-handling mechanism probably in association with No.17 type fuze to prevent any effective action being taken at an early stage. The natural leakage of the condenser system is such that the fuze would probably be safe after 48 hrs. No action is recommended if this fuze is found alone or in association with any fuze other than No.17. When these two types occur together the No.50 fuze cannot be rendered safe by any external discharger and drilling of the fuze under precautions would be necessary. A satisfactory procedure for this operation has not yet been established.

139. Detection of Bomb Detonation.

When enemy bombs are dropped in open ground with delay action devices they frequently penetrate to distances of 20 to 30 feet and explosion may occur without any conclusive indication on the surface. It may be necessary to obtain definite information on this point, particularly where the ground is normally required for use, such as a football pitch, drill ground, aerodromes etc.

As carbon monoxide gas is to be expected from the detonation of H.E. the lowering of a Gas Leak Indicator for Carbon Monoxide into the hole will indicate, after at least 5 minutes in position, whether Carbon Monoxide is present or not. If present, the bomb has burst, if not the bomb is probably intact.

The indicator should not be brought into use until it is clear that the fuze is "blind" i.e. a period of 8 days should elapse between dropping and testing.

140. German 20 mm. aircraft shell and fuze. (Fig.33)

This H.E. Shell has been found on various occasions after aerial combat between enemy and our aircraft in France and in the United Kingdom.

It is used in the Heavy Machine Gun *Übersehn* 20 mm. *FLAK* M.G. 30 for aircraft and A.A.

It consists of a steel body in three parts comprising :-

- (a) A cylindrical body.
- (b) A practically hemispherical part which forms the base of the shell.
- (c) A threaded ring screwed inside (a) and (b) and acting as a connection between them.

At the upper part of the base a cannellure is formed which is probably for indenting the cartridge case.

The body of the shell is painted yellow as far as the cannellure the part fitting inside the case being unpainted. It is filled with a pink coloured explosive, probably T.N.T.

The shells recovered were fitted with either a fuze marked A.Z. 1502 DWM 11 or a fuze marked EZZ dr C/30.

Fuze EZZ dr C/30 is an instantaneous nose fuze fitted on a tracer shell and carrier inside it a brass tube which contains the tracer composition. This is mainly lead and manganese and is in the form of a white powder.

Fuze AZ. 1502 DWM 11  
Fig. 33.

This D.A. fuze screws into a ring carried in the head of the shell and is fixed with three punch marks.

The body is of steel coated with brass and the nose of the fuze is closed with a copper cover plate.

The arming system consists of a spiral spring rolled around two half rings which retain the striker in position.

Action.

On firing the spiral spring unrolls under the effect of centrifugal force thus releasing the two half rings which in turn free the striker. Both spring and half collars remain inside the fuze.

During flight "creep" action and the protection of the cover plate keeps the striker clear of the detonator. On impact the striker extension is driven in actuating the striker.

141. 1 Kg. Incendiary Bomb.

With reference to Item 80 Bulletin No.8 a section of a 1 Kg. incendiary bomb is shown in Fig. 34.

The bomb consists of a magnesium tube threaded at the base to take a base plug, the opposite end of the tube is fitted with a tail riveted on and threaded to receive a filling plug. The base plug is recessed to take a percussion fuze AZ.8312\*, which consists of a needle pellet, pellet spring and a detonator with detonator plug. The needle pellet is held in a safe position by a split safety pin which is removed before loading the bombs in the aircraft.

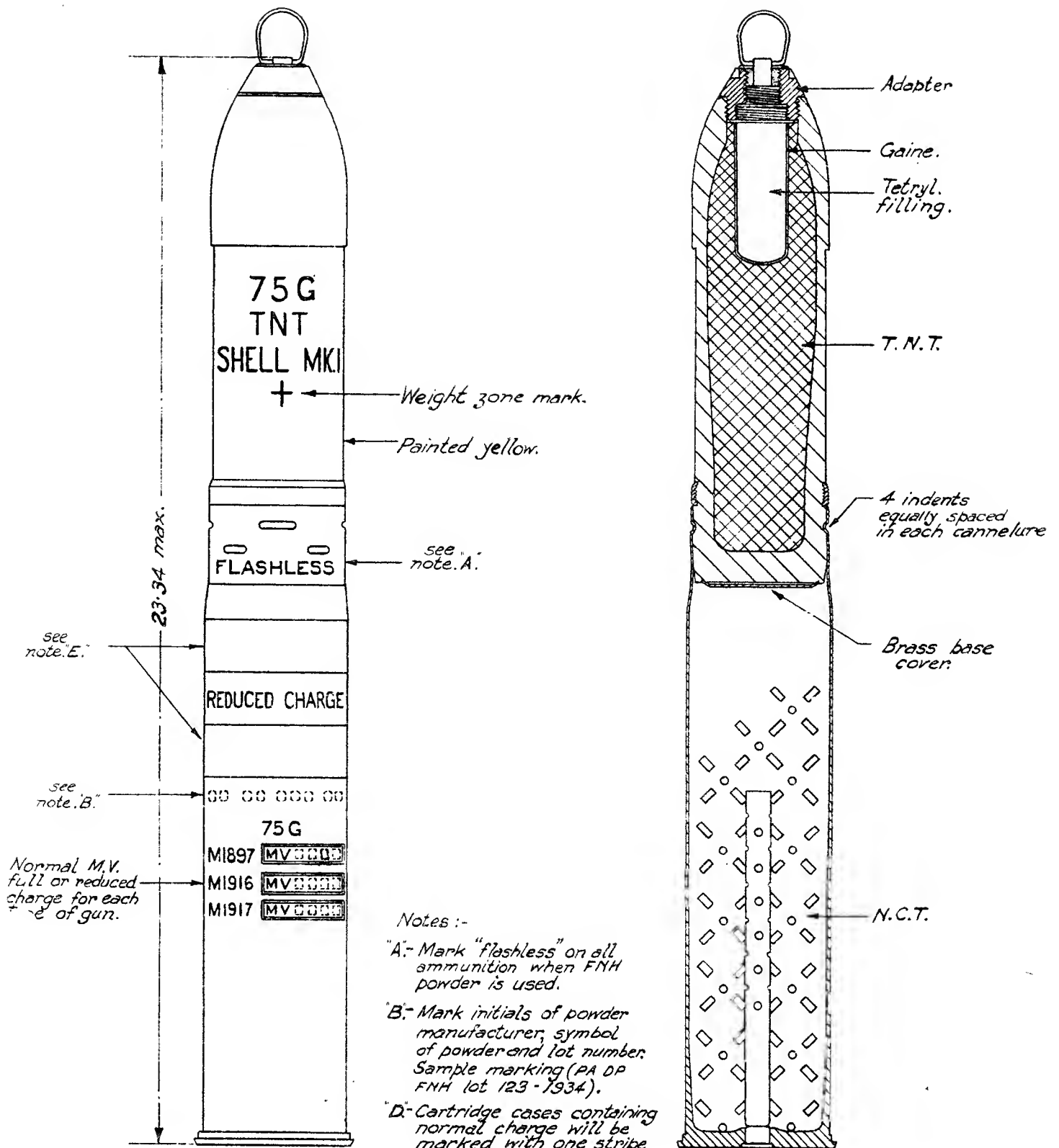
The filling is an incendiary composition consisting of 50 gms. of aluminium and hammer scale, 25 and 75% respectively above which is 130 gms of aluminium magnesium alloy 50/50 and hammer scale in the same proportions. This composition is filled loose in the bomb and is kept off the detonator in the base by an aluminium plate supported on an aluminium spring distance piece which is cut spirally. In the centre of the aluminium plate there is a small priming cap containing a lead styphnate composition which is fired directly by the detonator in the base. The primer cap is capable of firing the incendiary composition which vents through the holes in the spring distance piece, these are in line with the vent holes in the body.

This bomb can be fired, after the safety pin has been removed, by dropping it plumb from a height of 16-ft. or more or by striking it a hard blow against wood or similar substance. If left unattended on non-inflammable surroundings it will burn out in about 10 mins. The light given off is a dull yellow and it is considered that 4-ft. is a safe distance at which to stand from the bomb when extinguishing it as the splintering and spluttering is limited to a radius of about 2-ft. One or two of these bombs are carried in some German aircraft for the destruction of the plane by the crew in the event of a forced landing in enemy territory.

Amendment to Bulletin No.12.

Item 122. Heading "Marking of Ammunition" add "packages".

FIG. 30.



Notes :-

"A"- Mark "flashless" on all ammunition when FNH powder is used.

"B"- Mark initials of powder manufacturer, symbol of powder and lot number. Sample marking (PA DP FNH lot 123-1934).

"D"- Cartridge cases containing normal charge will be marked with one stripe on base.

"E"- Cartridge cases containing reduced charge will be marked on the base with two stripes at right angles, and on the side with two bands and the words "REDUCED CHARGE" as shown.

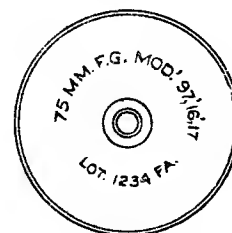
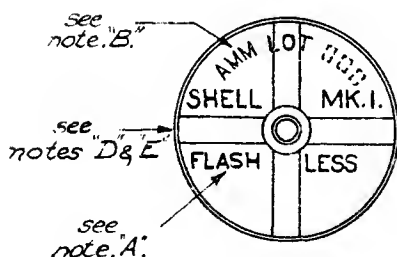


FIG. 31.

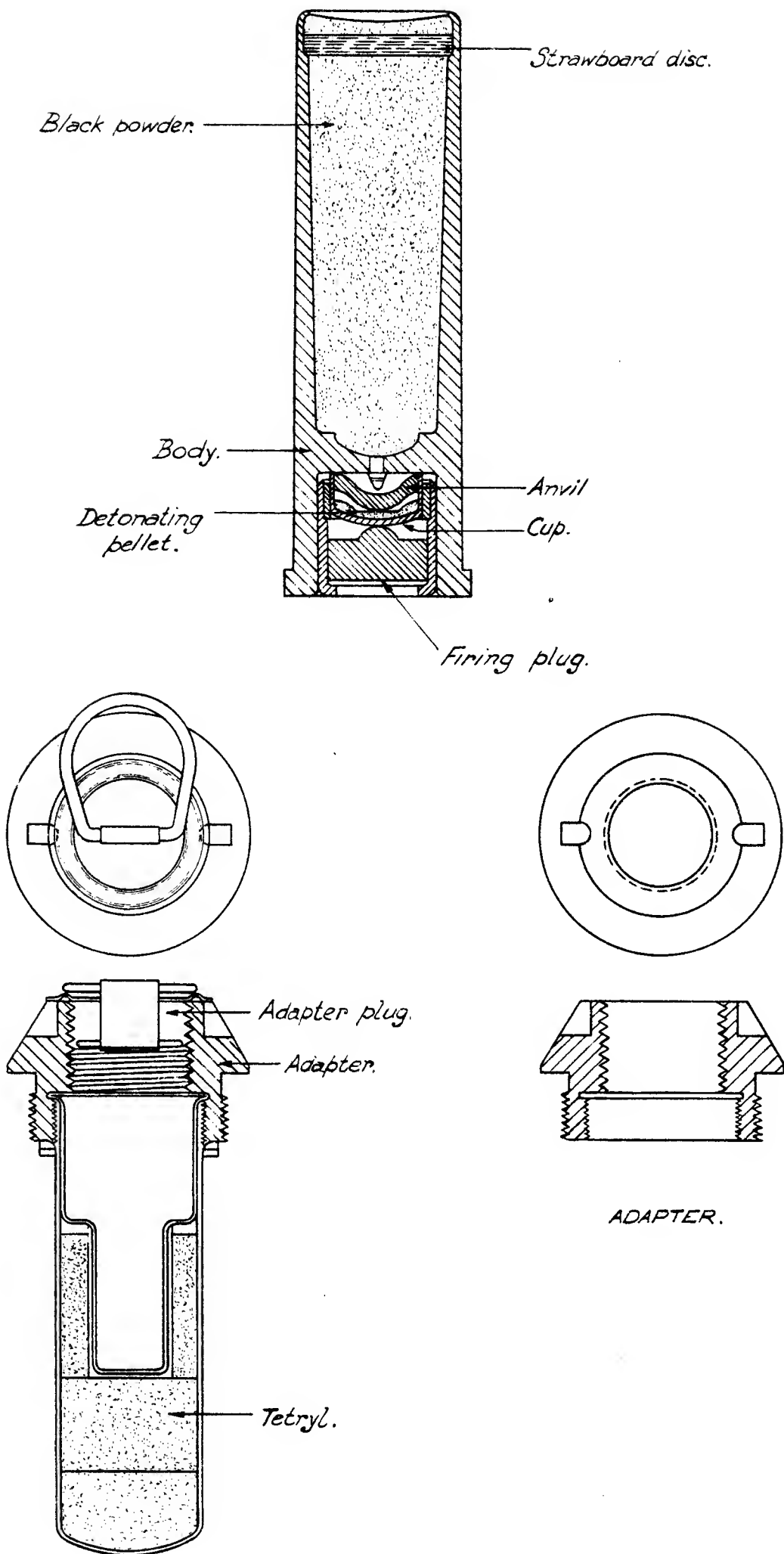


FIG. 32.

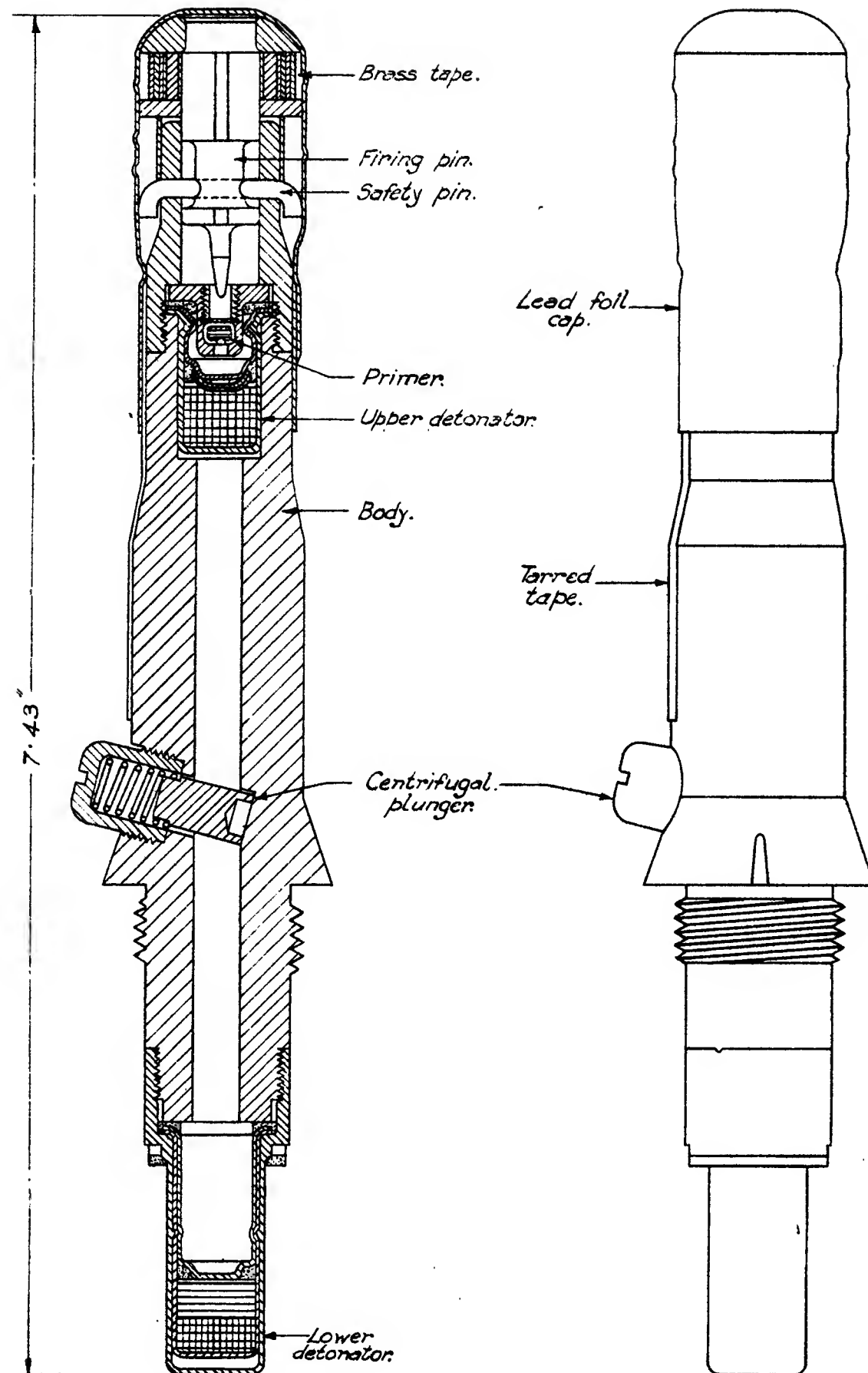


FIG. 33.

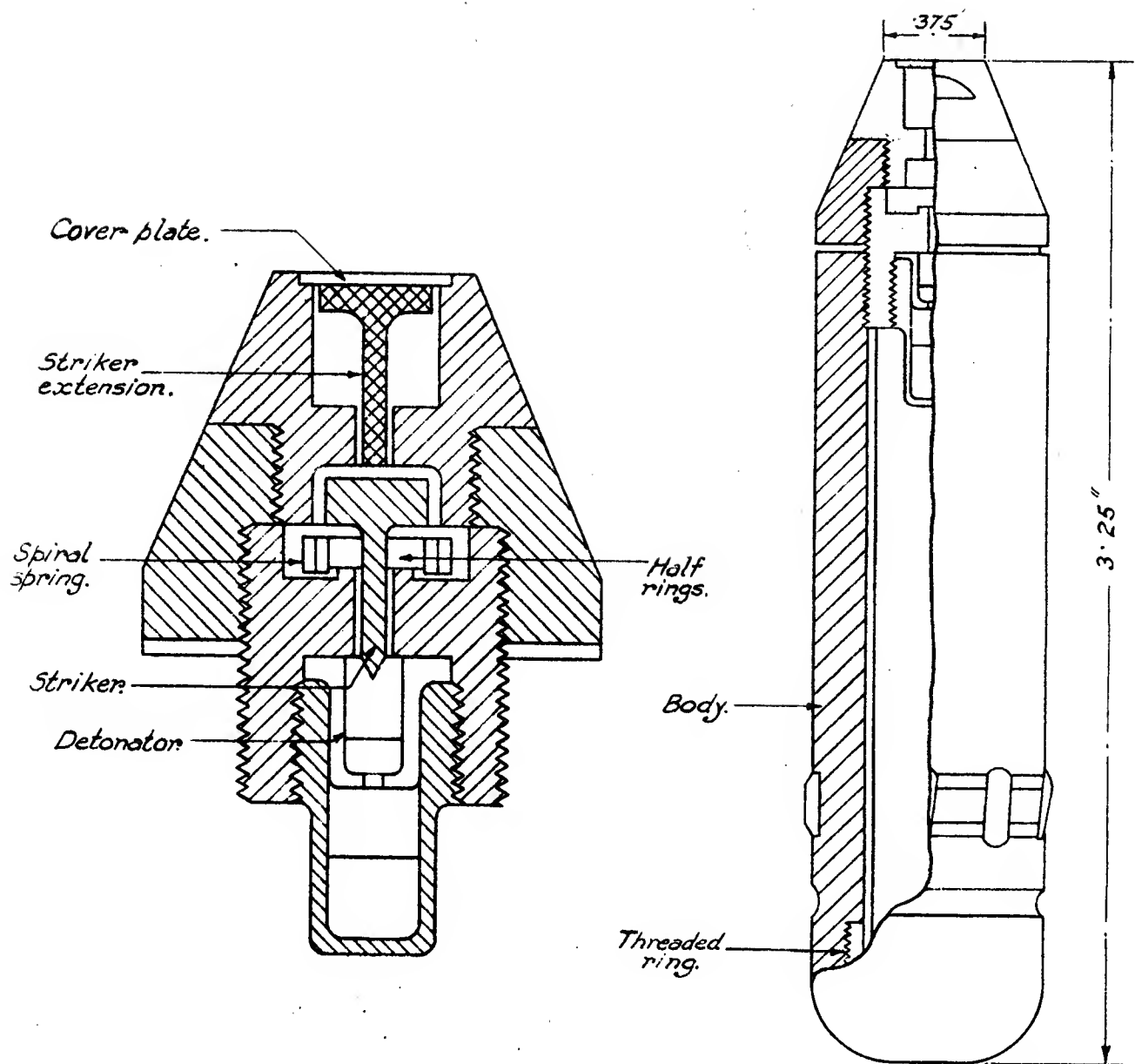
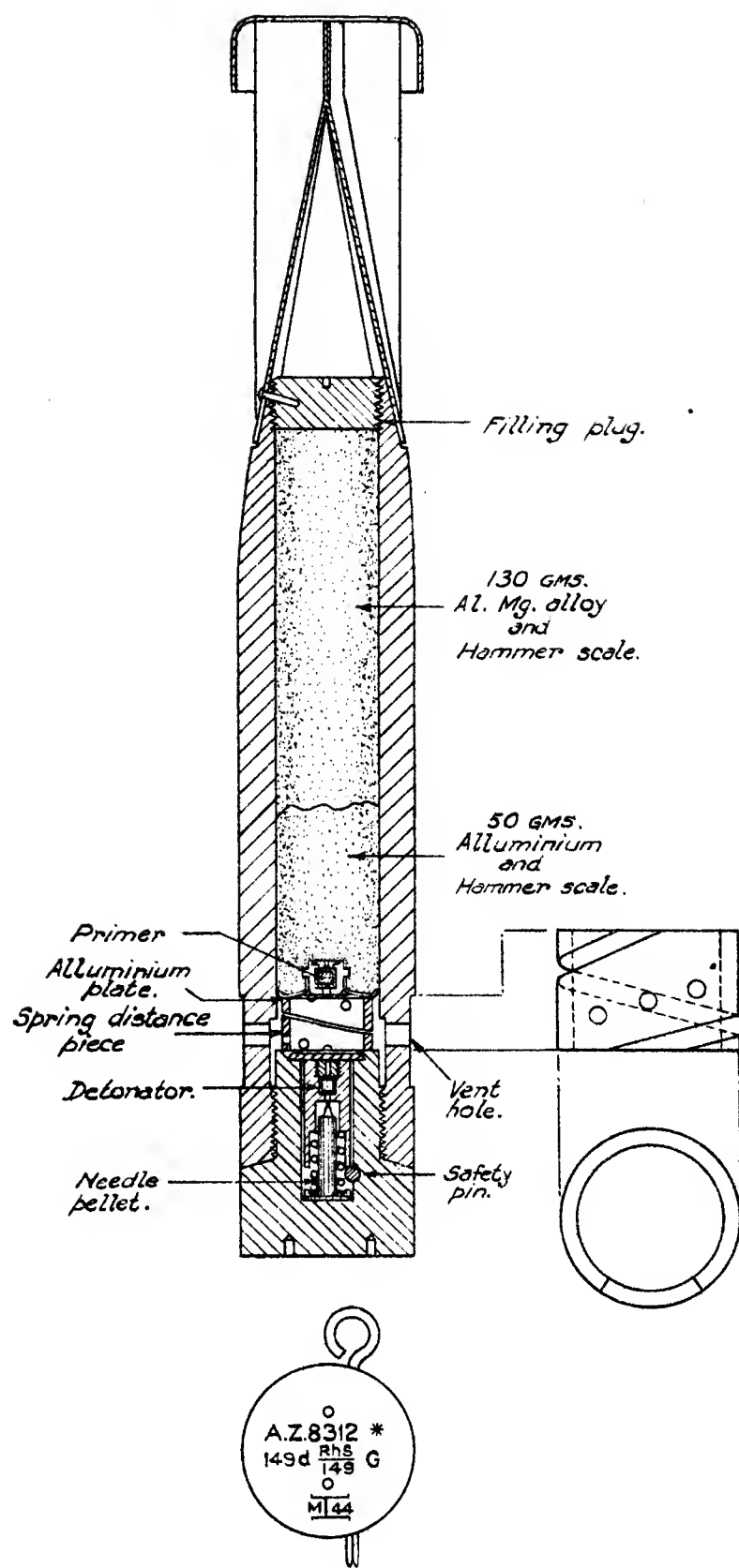




FIG. 34.





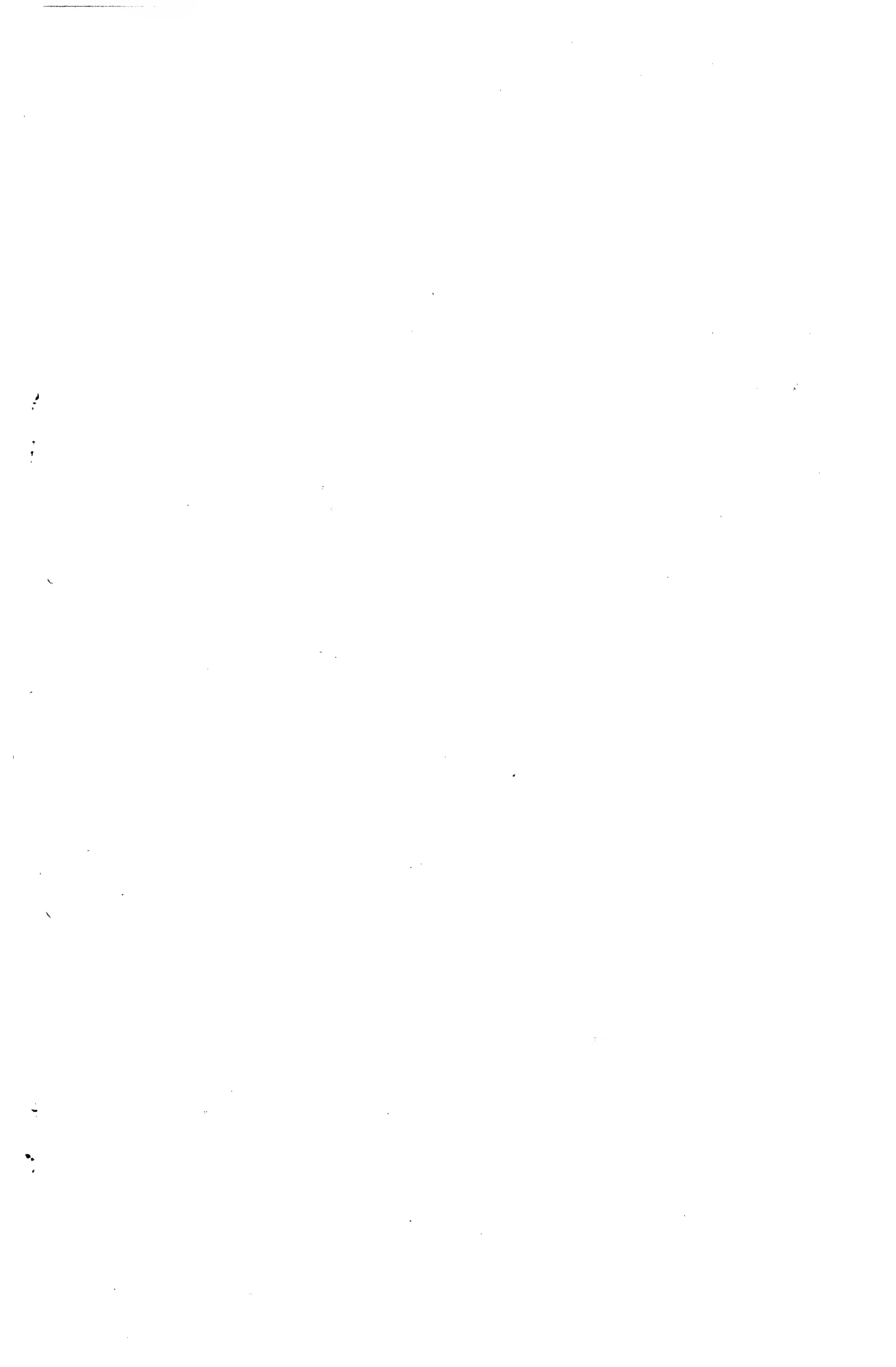




FIG. 32.

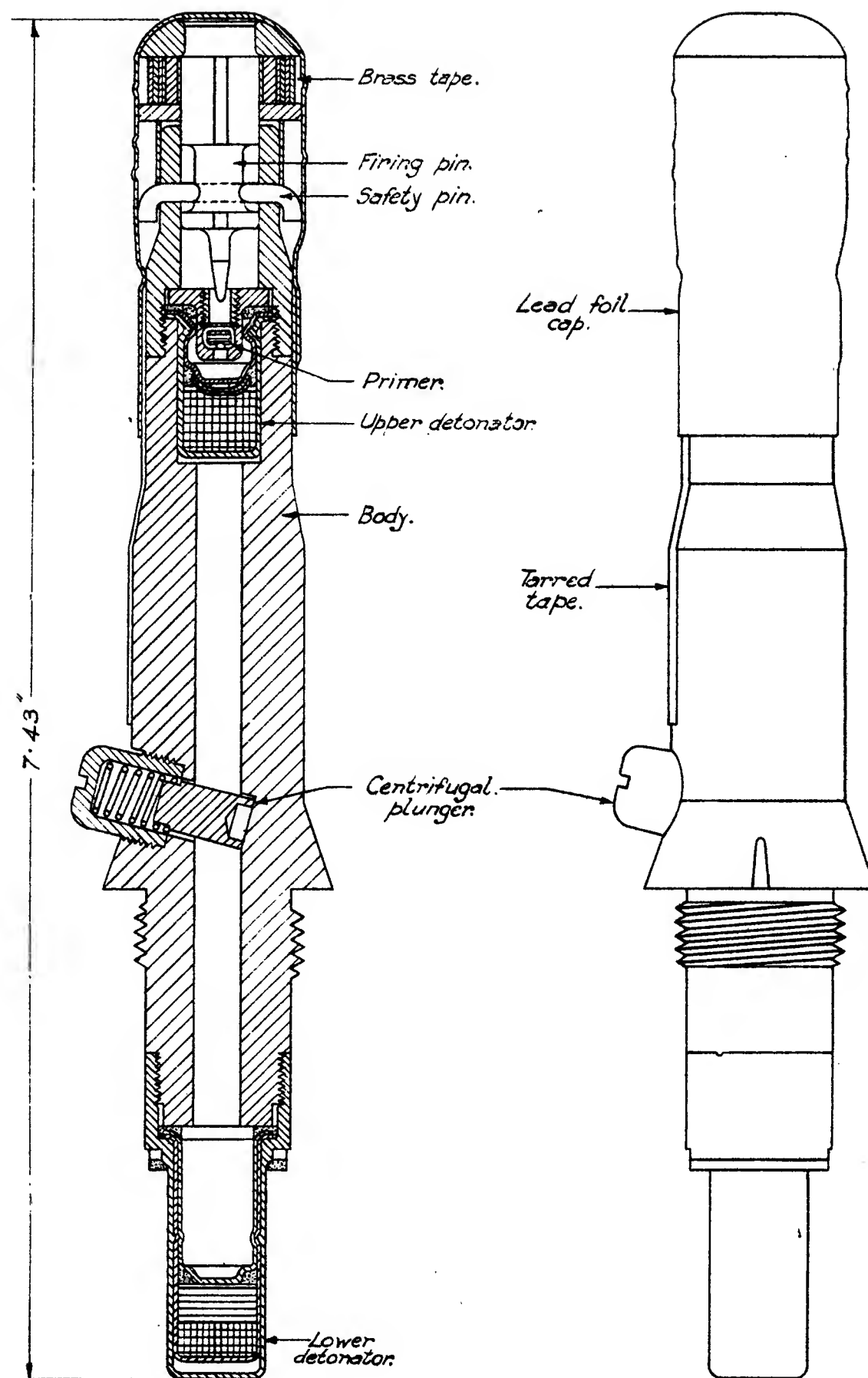


FIG. 33.

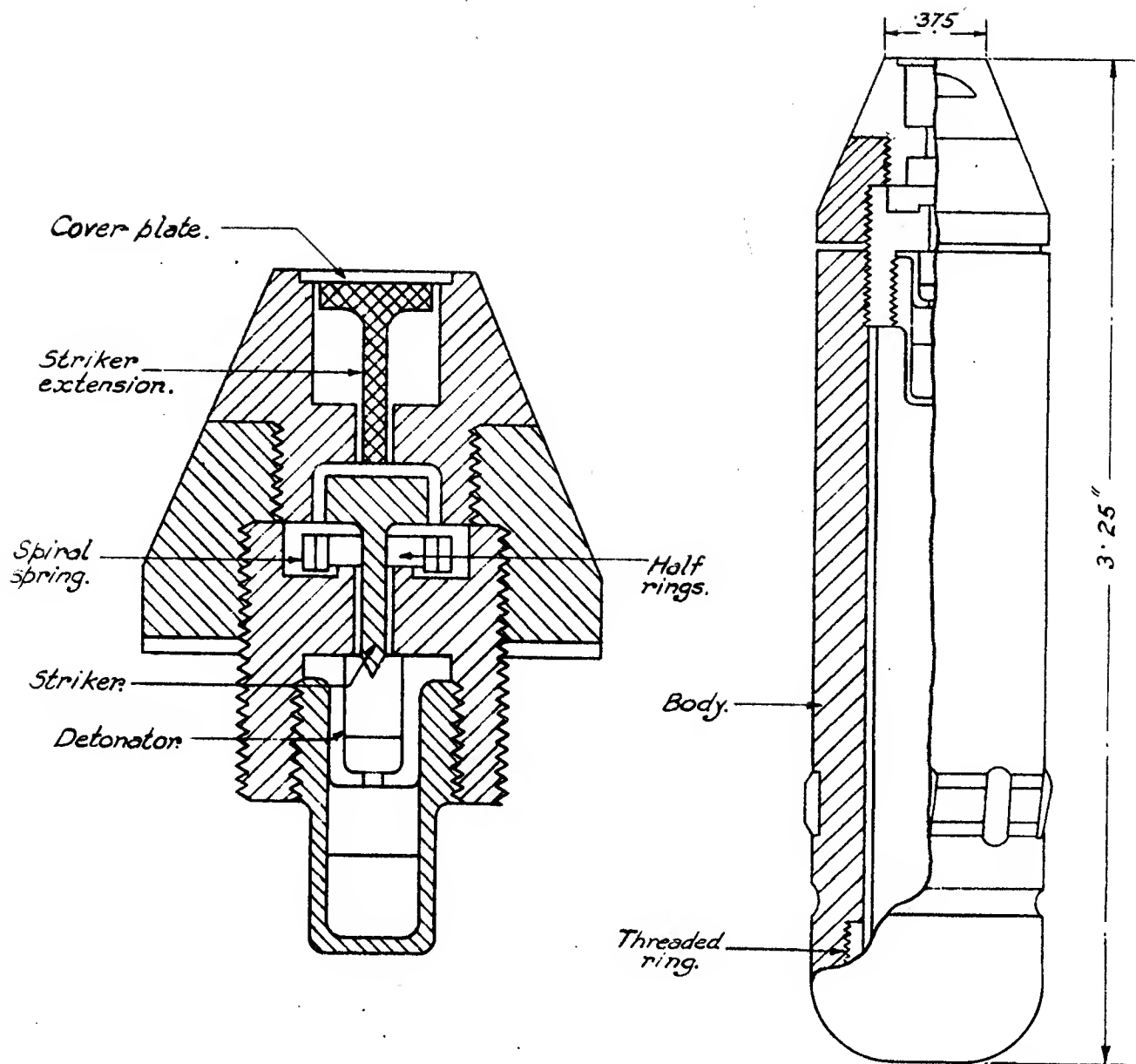


FIG. 34.

